IN THE CLAIMS

Please cancel Claims 1, 17, 25, 49, and 50 without prejudice or disclaimer.

Claim 1 (cancelled).

Claim 2 (currently amended): A retract circuit for retracting a data transducer carriage assembly of a mass data storage device to a retracted position, comprising:

a digital state machine;

said digital state machine being user programmable to operate in a selected retract mode;

an analog control circuit for receiving control signals from said digital state machine for providing analog retract signals to move said data transducer carriage assembly; and

~~The retract circuit of claim 1 further comprising~~ an analog driver to receive control signals from said digital state machine, said analog driver having a programmable gain.

Claim 3 (currently amended): A retract circuit for retracting a data transducer carriage assembly of a mass data storage device to a retracted position, comprising:

a digital state machine;

said digital state machine being user programmable to operate in a selected retract mode;

and an analog control circuit for receiving control signals from said digital state machine for providing analog retract signals to move said data transducer carriage assembly.

~~The retract circuit of claim 1~~ wherein said digital state machine is user programmable to operate in constant voltage, velocity detect, float and pulse, and crash stop detect modes.

Claim 4 (currently amended): A retract circuit for retracting a data transducer carriage assembly of a mass data storage device to a retracted position, comprising:

a digital state machine;

said digital state machine being user programmable to operate in a selected retract mode;

and an analog control circuit for receiving control signals from said digital state machine for providing analog retract signals to move said data transducer carriage assembly.

~~The retract circuit of claim 1~~ wherein said digital state machine is programmed to detect a velocity of said data transducer carriage assembly.

Claim 5 (original): The retract circuit of claim 4 wherein said digital state machine is programmed to detect an error velocity of said data transducer carriage assembly from a difference of a measured voltage across said data transducer driver from a predetermined voltage.

Claim 6 (original): The retract circuit of claim 5 wherein said predetermined voltage is user programmable.

Claim 7 (original): The retract circuit of claim 5 wherein said predetermined voltage is user programmable to a resolution of two bits.

Claim 8 (original): The retract circuit of claim 5 wherein said predetermined voltage is user programmable to a resolution of more than two bits.

Claim 9 (original): A retract circuit for retracting a data transducer carriage assembly of a mass data storage device to a retracted position, comprising:

means for establishing a digital state machine;

said means for establishing a digital state machine being user programmable to operate in a selected retract mode;

and means for establishing an analog control circuit for receiving control signals from said means for establishing a digital state machine for providing analog retract signals to move said data transducer carriage assembly.

Claim 10 (original): The retract circuit of claim 9 further comprising means for establishing an analog driver to receive control signals from said means for establishing digital state machine, said means for establishing analog driver having a programmable gain.

Claim 11 (original): The retract circuit of claim 9 wherein said means for establishing digital state machine is user programmable to operate in constant voltage, velocity detect, float and pulse, and crash stop detect modes.

Claim 12 (original): The retract circuit of claim 9 wherein said means for establishing digital state machine is programmed to detect a velocity of said data transducer carriage assembly.

Claim 13 (original): The retract circuit of claim 12 wherein said means for establishing digital state machine is programmed to detect an error velocity of said data transducer carriage assembly from a difference of a measured voltage across said data transducer driver from a predetermined voltage.

Claim 14 (original): The retract circuit of claim 13 wherein said predetermined voltage is user programmable.

Claim 15 (original): The retract circuit of claim 13 wherein said predetermined voltage is user programmable to a resolution of two bits.

Claim 16 (original): The retract circuit of claim 13 wherein said predetermined voltage is user programmable to a resolution of more than two bits.

Claim 17 (cancelled).

Claim 18 (currently amended): A mass data storage device, comprising:

a retract circuit for retracting a data transducer carriage assembly of a mass data storage device to a retracted position, including

a digital state machine;

said digital state machine being user programmable to operate in a selected retract mode;

an analog control circuit for receiving control signals from said digital state machine for providing analog retract signals to move said data transducer carriage assembly; and

~~The mass data storage device of claim 17 further comprising~~ an analog driver to receive control signals from said digital state machine, said analog driver having a programmable gain.

Claim 19 (currently amended): A mass data storage device, comprising:

a retract circuit for retracting a data transducer carriage assembly of a mass data storage device to a retracted position, including

a digital state machine;

said digital state machine being user programmable to operate in a selected retract mode;

and an analog control circuit for receiving control signals from said digital state machine for providing analog retract signals to move said data transducer carriage assembly,

~~The mass data storage device of claim 17~~ wherein said digital state machine is user programmable to operate in constant voltage, velocity detect, float and pulse, and crash stop detect modes.

Claim 20 (currently amended): A mass data storage device, comprising:

a retract circuit for retracting a data transducer carriage assembly of a mass data storage device to a retracted position, including

a digital state machine;

said digital state machine being user programmable to operate in a selected retract mode;

and an analog control circuit for receiving control signals from said digital state machine for providing analog retract signals to move said data transducer carriage assembly.

~~The mass data storage device of claim 17~~ wherein said digital state machine is programmed to detect a velocity of said data transducer carriage assembly.

Claim 21 (original): The mass data storage device of claim 20 wherein said digital state machine is programmed to detect an error velocity of said data transducer carriage assembly from a difference of a measured voltage across said data transducer driver from a predetermined voltage.

Claim 22 (original): The mass data storage device of claim 21 wherein said predetermined voltage is user programmable.

Claim 23 (original): The mass data storage device of claim 21 wherein said predetermined voltage is user programmable to a resolution of two bits.

Claim 24 (original): The mass data storage device of claim 21 wherein said predetermined voltage is user programmable to a resolution of more than two bits.

Claim 25 (cancelled).

Claim 26 (currently amended): A method for retracting a data transducer carriage assembly of a mass data storage device to a retracted position, comprising:

providing a user programmable digital state machine to operate in a selected retract mode;

providing analog control circuit in response to signals provided by said digital state machine for providing analog retract signals to said data transducer carriage assembly; and

~~The method of claim 25 further comprising~~ providing an analog driver having a programmable gain to receive control signals from said digital state machine.

Claim 27 (currently amended): A method for retracting a data transducer carriage assembly of a mass data storage device to a retracted position, comprising:

providing a user programmable digital state machine to operate in a selected retract mode;

and providing analog control circuit in response to signals provided by said digital state machine for providing analog retract signals to said data transducer carriage assembly,

~~The method of claim 25~~ wherein said providing a digital state machine comprises providing a digital state machine that is user programmable to operate in constant voltage, velocity detect, float and pulse, and crash stop detect modes.

Claim 28 (currently amended): A method for retracting a data transducer carriage assembly of a mass data storage device to a retracted position, comprising:

providing a user programmable digital state machine to operate in a selected retract mode;

and providing analog control circuit in response to signals provided by said digital state machine for providing analog retract signals to said data transducer carriage assembly.

~~The method of claim 25~~ wherein said providing a digital state machine comprises providing a digital state machine that is programmed to detect a velocity of said data transducer carriage assembly.

Claim 29 (currently amended): A method for retracting a data transducer carriage assembly of a mass data storage device to a retracted position, comprising:

providing a user programmable digital state machine to operate in a selected retract mode;

and providing analog control circuit in response to signals provided by said digital state machine for providing analog retract signals to said data transducer carriage assembly.

~~The method of claim 25~~ wherein said providing a digital state machine comprises providing a digital state machine that is programmed to detect an error velocity of said data transducer carriage assembly from a difference of a measured voltage across said data transducer driver from a predetermined voltage.

Claim 30 (original): The method of claim 29 wherein said predetermined voltage is user programmable.

Claim 31 (original): The method of claim 29 wherein said predetermined voltage is user programmable to a resolution of two bits.

Claim 32 (original): The method of claim 29 wherein said predetermined voltage is user programmable to a resolution of more than two bits.

Claim 33 (original): A retract system for retracting a head assembly in a hard disk drive, comprising:

means for measuring a velocity of a voice coil motor (VCM),

means responsive to a velocity measurement for establishing a retract voltage;

and means for applying said retract voltage to said VCM.

Claim 34 (original): The retract system of claim 33 further comprising:

a digital processor for configuring said means for measuring, means for establishing a retract voltage, and means for applying said retract voltage to operate in a plurality of operating modes.

Claim 35 (original): The retract system of claim 33 further comprising means for operating said hard disk drive in one of a plurality of selectable operating modes.

Claim 36 (original): The retract system of claim 35 wherein said means for operating said hard disk drive in one of a plurality of selectable operating modes comprises means for operating said hard disk drive in a constant voltage mode in which a constant retract voltage is applied to said voice coil motor when a retract signal is enabled.

Claim 37 (original): The retract system of claim 35 wherein said means for operating said hard disk drive in one of a plurality of selectable operating modes comprises means for operating said hard disk drive in a velocity detect mode in which drive signals are removed from said voice coil motor, a velocity of said head assembly is determined, and an appropriate constant retract voltage is applied to said voice coil motor.

Claim 38 (original): The retract system of claim 35 wherein said means for operating said hard disk drive in one of a plurality of selectable operating modes comprises means for operating said hard disk drive in a a float and pulse mode in which drive signals are removed from said voice coil motor, and a repeating pulse is applied a predetermined number of times.

Claim 39 (original): The retract system of claim 38 in which the repeating pulse is applied 32 times.

Claim 40 (original): The retract system of claim 35 wherein said means for operating said hard disk drive in one of a plurality of selectable operating modes comprises means for operating said hard disk drive in a crash-stop-detect mode in which a condition in which said head assembly is against crash the stop is detected, and a constant voltage is applied to hold said head assembly thereagainst.

Claim 41 (original): In a hard disk drive, a system for moving a head assembly to a retract position, a position of said head assembly being controlled by a voice coil motor, comprising:

an analog section connected to said voice coil motor to apply controllable drive voltages thereto to selectively position said head assembly;

and a digital section connected to receive signals from said analog section and said hard disk drive that reflect operating conditions of said hard disk drive, said digital section including:

a digital state machine defining a number of operating states, said digital state machine moving from state to state in response to conditions in said hard disk drive, and operating to produce digital command signals including a retract command to control said analog section to move said head assembly to said retract position,

and a decoder and digital to analog converter to decode said digital command signals and convert said digital command signals to analog signals for controlling said analog section.

Claim 42 (original): The retract system of claim 41 wherein said digital state machine includes states to determine a current velocity of said head assembly and to produce command signals to said analog section to command said analog section to apply a retract voltage related to said current velocity to said voice coil motor.

Claim 43 (original): The retract system of claim 41 wherein said digital section contains a digital processor connected to configure said state machine to operate in one of a number of operating modes.

Claim 44 (original): The retract system of claim 43 wherein said operating modes includes a constant voltage mode in which a constant retract voltage is applied to said voice coil motor when a retract signal is enabled.

Claim 45 (original): The retract system of claim 43 wherein said operating modes includes a velocity detect mode in which drive signals are removed from said voice coil

motor, a velocity of said head assembly is determined, and an appropriate constant retract voltage is applied to said voice coil motor.

Claim 46 (original): The retract system of claim 43 wherein said operating modes includes a float and pulse mode in which drive signals are removed from said voice coil motor, and a repeating pulse is applied a predetermined number of times.

Claim 47 (original): This retract system of claim 46 in which the repeating pulse is applied 32 times.

Claim 48 (original): The retract system of claim 43 wherein said operating modes includes a crash-stop-detect mode in which a condition in which said head assembly is against crash the stop is detected, and a constant voltage is applied to hold said head assembly thereagainst.

Claims 49 and 50 (cancelled).

Claim 51 (currently amended): A method for retracting a head assembly in a hard disk drive, comprising the steps for:

measuring a velocity of a voice coil motor (VCM) to determine a measured velocity,

establishing a retract voltage responsive to said measured velocity;

applying said retract voltage to said VCM; and

operating said hard disk drive in one of a plurality of selectable operating modes,

~~The method of claim 50~~ wherein said operating said hard disk drive in one of a plurality of selectable operating modes comprises operating said hard disk drive in a float and pulse mode in which drive signals are removed from said voice coil motor, and a repeating pulse is applied a predetermined number of times.

Claim 54 (original): The method of claim 53 in which the repeating pulse is applied 32 times.

Claim 55 (currently amended): A method for retracting a head assembly in a hard disk drive, comprising the steps for:

measuring a velocity of a voice coil motor (VCM) to determine a measured velocity,

establishing a retract voltage responsive to said measured velocity;

applying said retract voltage to said VCM; and

operating said hard disk drive in one of a plurality of selectable operating modes,

~~The method of claim 50~~ wherein said operating said hard disk drive in one of a plurality of selectable operating modes comprises operating said hard disk drive in a crash-stop-detect mode in which a condition in which said head assembly is against crash the stop is detected, and a constant voltage is applied to hold said head assembly thereagainst.

~~The method of claim 50~~ wherein said operating said hard disk drive in one of a plurality of selectable operating modes comprises operating said hard disk drive in a constant voltage mode in which a constant retract voltage is applied to said voice coil motor when a retract signal is enabled.

Claim 52 (currently amended): A method for retracting a head assembly in a hard disk drive, comprising the steps for:

measuring a velocity of a voice coil motor (VCM) to determine a measured velocity,

establishing a retract voltage responsive to said measured velocity;

applying said retract voltage to said VCM; and

operating said hard disk drive in one of a plurality of selectable operating modes,

~~The method of claim 50~~ wherein said operating said hard disk drive in one of a plurality of selectable operating modes comprises operating said hard disk drive in a velocity detect mode in which drive signals are removed from said voice coil motor, a velocity of said head assembly is determined, and an appropriate constant retract voltage is applied to said voice coil motor.

Claim 53 (currently amended): A method for retracting a head assembly in a hard disk drive, comprising the steps for:

measuring a velocity of a voice coil motor (VCM) to determine a measured velocity,

establishing a retract voltage responsive to said measured velocity;

applying said retract voltage to said VCM; and

operating said hard disk drive in one of a plurality of selectable operating modes,